

A heart valve that grows with a pediatric patient

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Credit: Abby Herschman, Kysar lab/Columbia University Irving Medical Center

A prototype of an expanding artificial heart valve could make a big dent in the number of surgeries that many kids born with congenital heart disease need.

The problem: Many [children](#) receive prosthetic valves that help save their lives, but the valves cannot grow with the child.

"We need to replace the valve once, twice, up to four times to replace a

valve that's too small, but each of these open-heart surgeries comes with significant risks," says David Kalfa, MD, Ph.D., a [pediatric surgeon](#) at Columbia University Vagelos College of Physicians and Surgeons whose lab created the prototype in collaboration with Jeffrey Kysar, Ph.D., professor of mechanical engineering.

Their study is [published](#) in the journal *Macromolecular Bioscience*.

An artificial heart valve that grows with the child could eliminate these risks.

The latest prototype from the team is built from a biocompatible polyurethane that closely matches the stretchiness of natural heart valves. To increase the size of the valve, a balloon catheter is inflated within the valve.

"Because the [polymeric material](#) can deform permanently, the valve stretches and then remains at that new larger size to accommodate the growing child—until it needs to be stretched again," Kysar says.

Testing of the [valve](#) demonstrated the feasibility of the concept, and the team is now building prototypes with improved materials and preparing to test their designs in animal models.

More information: Richard L. Li et al, In Vitro Proof of Concept of a First-Generation Growth-Accommodating Heart Valved Conduit for Pediatric Use, *Macromolecular Bioscience* (2023). [DOI: 10.1002/mabi.202300011](#)

Provided by Columbia University Irving Medical Center

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